

returning to the river, this time as a sightseer in a commercial tourist raft. The author develops a powerful and poignant analysis of the scope, costs and benefits of the development of the Colorado, which, in less than one man's lifetime, has become one of the most physically controlled and institutionally encompassed rivers in the world. It is sobering to realize, for example, that during the 19th century the Colorado was navigable from its mouth to beyond Yuma, yet, with the exception of 1983, for over 50 years no water has reached the Gulf of California at all! Again, it is almost frightening to

learn that from Powell's expedition in 1869 to 1949, only 100 people ran the Grand Canyon, whereas today the figure is 14 000 per year, even after strict regulation.

The book will be useful for those concerned with the history of environmental exploitation. For those who want a chance to share in that fascinating obsession which working with rivers can bring, it is essential and compelling reading.

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RIPARIAN LANDSCAPES by G. P. Malanson, Cambridge University Press, Cambridge, 1993. No. of pages: x + 296. Price: £35.00 (\$59.95). ISBN 0-521-38431-1.

This timely book is the latest in the well established *Cambridge Studies in Ecology* series. It attempts the difficult task of fusing together a diverse and fast-growing literature on ecological, geomorphological and hydrological processes in riparian areas. These various bodies of literature are interfaced through the landscape ecology paradigm which runs as a dominant (and sometimes overbearing) theme through the book.

Chapter 1 considers the principles of landscape ecology and applies them to riparian environments in order to provide a unifying conceptual framework for their study. In Chapter 2 a number of definitions are given, many of them aimed at giving the reader a better grasp of landscape ecology terminology, others at clarifying the nature of terrestrial-aquatic gradients and of ecological and geomorphological processes operating along them. The values of riparian environments (aesthetic, recreational, economic and environmental) are also considered. A review of riparian literature by ecoregion (seven main types are chosen) forms the bulk of Chapter 3. The important point is made that dominant processes in riparian areas vary according to geographical location,

as do the steepness of ecological gradients between riparian and surrounding areas. Chapter 4, entitled 'Internal Structure' is long and covers a wide range of topics contributing to our understanding of ecological and geomorphological characteristics of riparian areas. The emphasis here is very much on the spatial arrangements of biotic and abiotic elements. In Chapter 5, the movements of water, sediments and nutrients between these elements are discussed. The dynamics of riparian species is the main subject of Chapter 6, and includes consideration of genetic flows, dispersal mechanisms and invasions of exotic species. In the final chapter, simulation models and their role in the conservation and management of riparian landscapes are discussed.

Despite poorly reproduced photographs, this book is an excellent guide to the literature on riparian ecology, with good geographical coverage. It is a shame that the rather contrived language of landscape ecology is at times in danger of confusing rather than enlightening the reader. While landscape ecology can provide a perspective for integrating our knowledge of processes in a more spatially explicit way, it is, as remarked by the author, rather more useful as a concept than it is as a practical approach to working in real places.

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AN INTRODUCTION TO GLOBAL ENVIRONMENTAL ISSUES by K. T. Pickering and L. A. Owen, Routledge, London and New York, 1994. No. of pages: xxiii + 390. Price: £50 (hb), £15.99 (pb). ISBN 0-415-10227-8 (hb), 0-415-10228-6 (pb).

A great deal of effort, both presentational and financial, has gone into this handsome text book. It has literary

quotes, colour plates, fashionable boxes, summaries of key points, annotated guides to further reading, a lengthy glossary, issues for discussion, and copious line drawings. It is also broad in scope, aiming 'to explain the science behind the world's physical systems and processes, building on this factual base to explore the world's major environmental concerns including the effects on and of human activity'.

A large chunk of the text, not far off a third, deals with

climatic and atmospheric change. It looks at the past (including the events of the Quaternary) and at the present (ozone depletion, the greenhouse effect, etc.). Acid rain has a chapter of its own, as do nuclear issues, energy and natural hazards. The last two chapters are concerned with the human impact on the earth's surface and with environmental management.

The chapter dealing with human impacts on the earth's surface is short and in many ways the least satisfactory. If one takes one of the prime aims of the book as being 'to explore the world's major environmental concerns including the effects on and of human activity' then some of the issues in this chapter deserve more space than they get. Soil erosion, for example, arguably one of the most pernicious and pervasive global problems,

and certainly one that is real rather than speculative, gets not much more than a page. Permafrost degradation and pressures on the world's great tundra environment only get a paragraph! In short, the book has a certain imbalance, with the geomorphological components of global change being accorded less attention than they deserve.

Having said that, this book will be used in many undergraduate courses and will provide a generally valuable survey of a very large corpus of material at that vital human/physical interface.

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HILLSLOPE MATERIALS AND PROCESSES (2nd edition) by M. J. Selby, Oxford University Press, 1993. No. of pages: xv + 451. Price £22.50 (hardback £48.00). ISBN 0-19-874183-9.

Eleven years on from its first publication, the second edition of this book is a welcome sight. The text is much changed, and expanded from 11 to 19 chapters and from 264 to 451 pages. The emphasis on supporting illustrative material remains one of the strengths of the new edition, which includes over 250 diagrams and 130 plates. What of the content: what is the same, what has changed and what is new? Some chapters have been expanded and others added, and Selby has broadened the scope of his book, incorporating much recently published material and addressing criticisms by reviewers of the first edition. However, the balance is largely unchanged. Following a brief introduction, six chapters are devoted to material properties, two to weathering and soils, two to water and hillslope hydrology, three to mass wasting, and a final four examine hillslope development models, hazard and risk, magnitude-frequency issues, and rates of denudation.

Notable additions in the materials section include a more detailed examination of bonding between particles (Chapter 2), a consideration of fabric development within soft sediment (Chapter 3), and a revised and expanded discussion of material stress, strain and rheology (Chapter 4). There follow sections which, apart from some re-ordering, are in many places much the same as in the earlier edition, with some elaboration. The discussions of the strength of earth materials (Chapter 5) and weathering processes (Chapters 8 and 9) remain comprehensive, and valuable sources of information. There are exciting new looks at some old subjects. Discontinuity characteristics in rock masses are one case in point, where rather than dwelling solely on important cross-joint parameters, such as surface roughness and continuity, the linkages of cracks to stress-strain patterns and stress field dynamics are considered.

Significant improvements on the first edition include a

much more comprehensive examination of soil erosion by water (Chapters 11 and 12). Models and theories of hillslope development (Chapter 16) are more thoroughly addressed. In other places—magnitude and frequency aspects of erosional events (Chapter 18), for example—issues are perhaps still underemphasized. Soil development is now considered (Chapter 9), as are other pedological matters including catenas, palaeosols and relationships between soil properties and environment (Chapter 10). Some chapters present in the first edition have been omitted, resulting in a more balanced text. For example, material on tors and bornhardts is now rolled into Chapter 9. There is also the welcome inclusion of issues such as landslide hazard (Chapter 17), and a more detailed discussion of flow failures on hillslopes (Chapter 14).

What criticism can be levelled at this revised text? The differential length of some chapters, which affects the overall balance of the book, remains noticeable. Sections on the stress, strain and strength of earth materials in 56 pages and mass wasting of soils in 49 pages, sit beside consideration of bonds in little more than four pages and magnitude-frequency issues in nine. Some of the new topics are a welcome sight but, in places, more depth would be useful. The significance of mudrock fabric is a case in point, dealt with in three pages using little text, but many diagrams and scanning electron micrographs. Similarly, the application of finite element methods in rock slope development is considered in a few pages during the discussion of stress, strain and rheology. An expanded exposition would be good to see, perhaps in the context of models of hillslope development rather than material properties. Some of the chapters could be better ordered for a more coherent presentation. Rock slope processes (Chapter 15) would sit better after consideration of rock mass properties (Chapter 6). It would also be sensible to consider the processes and products of weathering before dealing with the physical and geotechnical properties of materials, forming a natural progression to issues such as hillslope hydrology, mass wasting, the factor of safety and stability analysis.